

IN THE CLAIMS:

The following is a complete listing of claims in this application.

Claims 1-22 (canceled).

23. (new) A method for processing signals which are generated during the non-destructive examination of objects by reflection of ultrasonic waves at defect locations of the structure of the object, comprising the steps of:

emitting a complete wave front onto at least one section of the object to be examined by means of a plurality of independent transmitter elements;

receiving a wave reflected by the structure of the object by means of a plurality of receiver elements which are independent of one another;

the plurality of transmitter and receiver elements constituting a probe;

digitalizing the signals received from the receiver elements;

storing the digitalized signals according to amplitude and propagation time in a storage element; and

detecting defect locations by a phase-locked addition of the stored amplitude values along a propagation time.

24. (new) The method according to claim 23, wherein a defect location on an outer surface of the object facing the probe is identified by evaluating point-wave signals passing from the defect location.

25. (new) The method according to claim 23, wherein detection of a defect location on an outer surface of the object facing the probe is effected by an addition of amplitude values stored in the storage module which are derived from the point-wave signals proceeding from the outer defect.

26. (new) The method according to claim 23, wherein the

addition extends at a substantially right angle to an interference pattern of the received amplitude values of the point waves of defects on an outer surface of the object.

27. (new) The method according to claim 23, wherein detection of a defect location on an outer surface of the object facing the probe is effected by a comparison of the sum signal determined during the phase-locked addition of the stored amplitude values along a propagation time with the sum signal determined during the addition of the amplitude values of an interference pattern, an outer defect being present if both sum signals indicate a defect location (coincidence method).

28. (new) The method according to claim 23, wherein the individual transmitter elements are controlled in a time-delayed manner (phasing) to set a beam angle α adapted to test conditions.

29. (new) The method according to claim 23, wherein a propagation time dependent amplitude correction of the sum signal determined during the addition is performed to identify the location of the defect.

30. (new) The method according to claim 23, wherein the received signals are filtered after their digitalization for the data reduction.

31. (new) The method according to claim 23, wherein contour of a surface of the object to be examined is recorded and stored, and the independent transmitter elements are controlled in a time-delayed manner in such a way that the emanating wave front extends substantially parallel or to the contour of the surface of the object and the waves reflected by the object are received in a time-delayed manner and generate an essentially planar interference pattern.

32. (new) A method for the non-destructive examination of a contour of an object by processing signal waves which are

generated by reflection of ultrasonic waves at defect locations of the structure of the object, comprising the steps of:

emitting a complete wave front onto the at least one contour of the object to be examined by means of a plurality of independent transmitter elements;

receiving a wave reflected by the structure of the object by means of a plurality of receiver elements which are independent of one another;

digitalizing the signals received from the receiver elements;

storing the digitalized signals according to amplitude and propagation time in a storage element;

recording and storing the contour of a surface of the object to be examined; and

controlling the independent transmitter elements are controlled in a time-delayed manner such that the emanating wave front extends substantially parallel to the contour of the surface of the object and waves reflected by the object are received in a time-delayed manner and generate a substantially planar interference pattern.

33. (new) The method according to claim 32, wherein the contour of the object is determined by emitting a planar wave front onto the contour to be examined, the waves reflected by the contour of the object are received, digitalized by means of the plurality of receiver elements which are independent of one another and the digitalized signals are stored in the storage element at least according to propagation time, and wherein

the contour of the object is computed from a defined distance of the probe to the object and the different propagation times of the received signals.

34. (new) The method according to claim 32, wherein an interference pattern determined from the received signals is compared with a desired pattern and when there is a deviation from the desired pattern, a renewed contour measurement is performed.

35. (new) The method according to claim 32, wherein a subsequent determination of the contour of the object to be examined occurs during a measuring process.

36. (new) The method according to claim 32, wherein the wave front extending substantially parallel to the contour of the object to be examined is generated by a time-delayed emission of sound pulses.

37. (new) The method according to claim 32, wherein the received planar interference pattern is received by time-delayed actuation of the receiver elements which are independent of one another in dependence on the contour values stored in the storage unit.

38. (new) A circuit arrangement for processing signals which are generated during non-destructive examination of objects by reflection of ultrasonic waves at defect locations of the structure of the object, comprising:

a signal recording unit with a pulse generator for actuating transmitter/receiver elements for emitting a complete wave front and for switching the transmitter/receiver elements to receive, the transmitter/receiver elements constituting a probe;

a multiplexer via which analog signals applied to the receiver elements can be transmitted to A/D converters, and

a storage element to which outputs of converters are connected for storing digitalized signals,

wherein the storage element includes means for storing the digitalized signals with respect to their signal amplitude and propagation time and

a summing element for the phase-locked addition of the amplitude values stored in the storage element is arranged in tandem behind the storage element and a signal which can be evaluated with respect to the defect location is applied to an output of the summing element.

39. (new) The circuit arrangement according to claim 38, wherein the output of the summing element is connected via an interface I with an evaluation circuit in which an output of the summing element is connected with a signal processing circuit which has one or more evaluation modules for further assessment and evaluation of the signal applied to the output of the summing element.

40. (new) The circuit arrangement according to claim 38, wherein the evaluation module has a coincidence circuit for comparing the sum signals during a phase-locked addition of the amplitude values along a propagation time with the sum signals during addition of the amplitude values of the point-wave signals of outer defects.

41. (new) The circuit arrangement according to claim 38, wherein the probe is configured as a Phased Array Transducer.

42. (new) The circuit arrangement according to claim 38, wherein the transmitter/receiver elements are constructed and arranged to be controlled simultaneously or in a phase-shifted manner (phasing).

43. (new) The circuit arrangement according to claim 38, wherein the transmitter/receiver elements are made as a unit.

44. (new) The circuit arrangement according to claim 38, wherein the transmitter elements and receiver elements are made as separate units.